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ΑΝΑΚΟΙΝΩΣΗ

ΠΑΡΟΥΣΙΑΣΗ ΔΙΠΛΩΜΑΤΙΚΗΣ ΕΡΓΑΣΙΑΣ

«Manganese doped cadmium sulfide mesoporous frameworks for hydrogen production from water splitting under visible light»

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Link τηλεδιάσκεψης: https://virtconf.materials.uoc.gr/b/sta-2sp-fnj-ybw

Η παρουσίαση θα πραγματοποιηθεί με τηλεδιάσκεψη σύμφωνα με το τρίτο άρθρο, παρ. 1, της με αριθμ. 115744/Z1/4.9.2020 Κοινής Υπουργικής Απόφασης (Β΄3707).

Περίληψη:

Photocatalytic water splitting to produce hydrogen using solar energy is a particularly attractive solution to increasing energy demands. However, to be of practical use, semiconductor electrodes need to made of inexpensive, abundant elements and have a high, yet stable, photocatalytic H_2 production activity. This project involves the development of porous networks of Mn-doped CdS (Mn/CdS) nanoparticles with different doping levels of Mn (i.e., 1– 4 mol%) on the crystal structure of cadmium sulfide (CdS). The synthesis of mesoporous CdS (*meso*-CdS) and porous Mn/CdS nanoparticle assemblies was accomplished by oxidative polymerization of CdS and Mn-doped CdS nanoparticles, respectively, stabilized with 3-mercaptopropionic acid ligands in the presence of a block co-polymer (Brij-58) as a template. The chemical composition of as-prepared materials was characterized by elemental X-ray microanalysis (EDS). Powder X-ray diffraction (XRD) and N_2 physisorption measurements revealed that *meso*-CdS and Mn/CdS mesoporous samples have a crystal structure with a cubic (zinc blende) symmetry and possess a nanoporous architecture with BET surface areas of ~130–205 m^2/g and narrow-sized pores ~1.8–7.2 nm. The energy gap of the materials has been evaluated at ~2.63–2.7 eV by diffuse-reflectance ultraviolet-visible (UV-vis) spectroscopy. The nanoporous Mn/CdS nanoparticle assemblies were examined as photocatalysts toward hydrogen production by water splitting. Catalytic studies indicated that the resulting Mn/CdS materials exhibit high activity for the evolution of hydrogen under visible light illumination ($\lambda \geq 420$ nm). Among the samples studied, Mn/CdS catalyst containing 1.5 mol% Mn showed the highest photocatalytic activity, giving an average H_2 evolution rate of ~0.17 mmol/h.